Hungarian Vowel Harmony

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0 Introduction

The basic characteristics of Hungarian vowel harmony are well known - the data introduced in the pioneering work of Vágó (1975, 1976) has been subjected to a large number of analyses. In this paper I will assume the reader to be familiar with this literature and with the basic data concerning 'binary' suffixes such as the dative na/na. (For an overview, see v.d.Hulst 1988 or Siptár 1984).

In Section 1, I will exemplify a number of additional facts concerning the harmonic behavior of 'ternary' suffixes such as the allative ho/ho/ho and 'quaternary' suffixes such as the accusative a/a/a/a. Quaternary suffixes, presented here for the first time, appear to be problematic both for the standard accounts and for the more recent theory of underspecification. Ternary suffixes, although discussed by Vágó (1975), have largely been ignored in the subsequent literature - here the familiar data concerning binary and ternary suffixes will be reorganized along the lines dictated by the new facts.

Section 2 gives an autosegmental account of the harmonic patterns in Hungarian. The use of a single diacritic feature, a 'floating -U', will make it possible to treat the regular and the exceptional patterns together. Negative feature values and core specification are used only for the exceptional cases - the basic system uses only single-valued features that leave no room for underspecification. The analysis brings into sharp relief a hitherto unnoticed parallelism between high and mid vowels that extends even to the exceptional cases.

Section 3 discusses the behavior of neutral vowels. The status of neutral vowels in harmony systems is problematic for autosegmental theory in general, and the present treatment is no exception. As we shall see, each vowel in Hungarian can show 'regular' or 'exceptional' behavior, and the exceptional forms can be derived by the same rules as the regular forms by adding a single diacritic to the underlying representation of exceptional stem vowels. In neutral vowels we can observe a third kind of behavior, so we will have to adjust the underlying representations in an extraordinary fashion (namely, by core-specification) to account for the two kinds of 'abstract' i and e.

In the presentation of the data, the emphasis will be shifted from vacillating stems to exceptional, but non-vacillating stems. The reasons for this shift are methodological. The exceptional 'Class I' and 'Class IV' stems show the same unambiguous behavior irrespective of sentence stress, syntactic environment, register, etc. for every speaker of standard Hungarian. In the phonological study of vacillation it would be necessary to control for all of these factors, and perhaps for others as well. The existing literature, based largely on anecdotal evidence, is of little help here, as it makes no systematic distinction between dialect mixture, vacillation in production, and varying degrees of acceptance. In fact, empirical work on vacillating stems is still in its infancy, while the information on exceptionality is readily available from standard dictionaries.

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1 For the first steps in this direction, see Kontra and Ringen 1985, 1986.
1 The data

The vowel system of Hungarian is given in (1) below - for a description in phonetic terms, see e.g. Nadasdy (1985). In this paper, forms will be given in orthographic, rather than phonetic, transcription.

(1) \[
\begin{array}{c}
\text{a} & \text{e} & \text{i} & \text{o} & \text{u} & \text{u}\text{' } & \text{ó} & \text{ő} \\
\text{á} & \text{é} & \text{é} & \text{í} & \text{ó} & \text{ú} & \text{ú}\text{' } & \text{ő}\text{'}
\end{array}
\]

1.1 The feature system

In general, discussions of Hungarian vowel harmony have revolved around what I will call the 'binary' suffixes, i.e. those that have two surface realizations. Ternary suffixes (i.e. those having three alternants) are also mentioned in passing, and quaternary suffixes are usually completely ignored. For the binary suffixes it is of course sufficient to deal with only one autosegment (or one distinctive feature), and leave the larger issue of the featural composition of Hungarian vowels untouched. But ternary and quaternary alternations involve at least two autosegments, and the choice of feature analysis (which will determine the rest of the analysis to a surprising extent) is far from trivial. For the reader's convenience, I will tabulate here the two main proposals (Vágó 1980, Becker-Makkai 1970):

(2) \[
\begin{array}{c}
\text{Back} & \text{High} & \text{Low} & \text{Round} & \text{Diffuse} & \text{Flat} & \text{Tense} & \text{Grave}
\end{array}
\]

- + + + - + + +
- - - - - - -
+ + + + + + +
- - - - - - -
+ + + + + + +
+ + + + + + +
+ + + + + + +
- - - - - - -

In this paper I will use a tridirectional feature system as proposed by Rennison (1984), Kaye et al (1985), and others. In essence, tridirectional features amount to an autosegmental version of the Jakobsonian feature system given above.

(3) \[
\begin{array}{c}
\text{I} & \text{U} & \text{U} & \text{I} & \text{U} & \text{U} & \text{I} & \text{U}
\end{array}
\]

This list is representative; there are no alternations involving other (sets of) vowels. Thus, ternary suffixes will always show e/a/ó, and quaternary suffixes a/ó/ó/ó alternation.7 Quaternary suffixes, though ignored in standard treatments, are in fact anything but marginal; the most frequently encountered suffixes, such as the accusative, the 1st and 2nd sg possessive, and the plural are all of this form. Nor are they restricted to inflection; the last example, es/es/és/és, 'having,' to do with 'is a high-frequency derivational suffix that forms adjectives from nouns.'

1.2 The major alternations

Suffixes will be subcategorized according to their arity, i.e. the number of harmonic alternants they have. Unary suffixes, i.e. those that do not show harmonic alternation, will be ignored. Some suffixes with higher arity are listed below:

(4) \[
\begin{array}{c}
\text{BINAR} & \text{TERT} & \text{QUAT}
\end{array}
\]

<table>
<thead>
<tr>
<th>SUFFIX</th>
<th>ARITY</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a/nk</td>
<td>1</td>
<td>a/nk/nk</td>
</tr>
<tr>
<td>i/ok</td>
<td>2</td>
<td>i/ok/ok</td>
</tr>
<tr>
<td>u/ek</td>
<td>3</td>
<td>u/ek/ek</td>
</tr>
<tr>
<td>e/lk</td>
<td>4</td>
<td>e/lk/lk</td>
</tr>
</tbody>
</table>

Terminology is as follows: ADE ' signifies', 'own', 'DAT' signifies 'doing', 'SUE signifies 'having', 'POS signifies 'having', 'PL signifies 'having', 'SG signifies 'having.'

This list is representative; there are no alternations involving other (sets of) vowels. Thus, ternary suffixes will always show e/a/ó, and quaternary suffixes a/ó/ó/ó alternation.

1.3 The harmonic taxonomy

Stems will be subcategorized according to the suffix-alternants they select. The taxonomy developed here will be applicable not only to stems, but also to fully formed words that can undergo further suffixation. The five classes presented below offer a theory-neutral descriptive framework encompassing all the non-vacillating Hungarian data.

In the binary case, all stems can be divided into two classes, 'Back' and 'Front,' according to the quality of the alternant they select. This taxonomy is based on the fundamental observation that the binary alternants can be arranged in parallel series: if a stem takes

Long vowels will be treated as geminates, because their harmonic behavior is identical to that of the corresponding short vowels.

An important advantage of this system is that it predicts what kinds of binary alternations are possible in Hungarian. If an alternating pair is defined by the presence vs. absence of the feature I, (3) shows that a will be paired with e, ó will be paired with õ and ó will be paired with u - these are precisely the pairs attested in Hungarian, as can be seen from (4) below. Moreover, since i is paired with the empty vowel, which does not exist in Hungarian, the system predicts that it cannot take part in alternations. (For an exceptional case, see Section 3.)
-nak in the dative, it will take -ndl, rather than -ndl in the dative, -ndl, rather than -ndl in the ablative, etc.\footnote{This observation has been contested on several occasions, but I was unable to find non-vocalic counterexamples that would take, say, -ndl in the dative but -ndl in the ablative. At any rate, it is an extremely robust generalization with no systematic counterexamples.}

With the introduction of quaternary suffixes, a four-way partitioning results, according to the quality of the vowel in ak/ek/ok/ök. Such a partitioning is then justified by the fact that other quaternary suffixes will take the alternate with the same vowel. Indeed, no stem can subcategorize for -ak in the plural but -a in the accusative, and in general the distributions of the quaternary alternants-as far as it can be established-are completely parallel.

This classification predicts the harmonic behavior of binary suffixes: all stems that take -ak (Class I) or -ek (Class II) in the plural take ‘Back’ suffixes and the rest take ‘Front’ suffixes. These classes also select for the e-alternant in ternary suffixes. In general, stems that take -ak (Class III) take the e-alternant in ternary suffixes, and stems that take -ek (Class IV) take the ə-alternant in ternary suffixes (Class V). But, most strikingly, the four-way classification established on the basis of the ternary suffixes does not fully predict the distribution of ternary suffixes. There are a number of stems (Class IV), that take -ak in the plural but take the ə-alternant rather than the e-alternant with ternary suffixes.

It should be emphasized that the behavior of Class IV stems is qualitatively different from that of Class V stems: ə-alternants are unacceptable in every idiolect, and in ECH\footnote{Educated Colloquial Hungarian, the standard (Budapest) dialect. See Nadasdy (1985)} the forms *holgyet, *togyet, *s.ii/tilez, *holgyot, *togyot, *s.ii/tilez, are unacceptable.

In order to characterize the range of possible stem vowels within each class, monomorphic examples were chosen. It will be apparent from (5) that the quality of the stem vowel determines the harmonic behavior of the stem to a large extent. If the stem vowel is ə or ɜ, the stem must be in Class IV or Class V, and if it is a or ə, the stem will belong in Class I or Class II. As long as the last vowel of a polysyllabic stem (or word) is not i or o, the quality of the last vowel will predict harmonic behavior the same way as with monomorphic stems. If the last vowel is neutral, the situation is more complex - the details will be discussed in Section 3.

For -a + V vowels the choice between Class IV and Class V is lexically determined, as in the choice between Class I and Class II (for -e vowels). However, only the selection of Class IV stems in Class V has to be marked in the lexicon - the default case is Class II for stems in a, u, and e, and Class V for stems in i and o. This is particularly clear for Class IV, which contains roughly 20 monomorphic stems, as opposed to the thousands of monomorphic stems in Class V. That Class IV is the marked class can also be seen from the fact that all recent loans in ə or ɜ are in Class V. Although Class I is much larger (it contains more than a thousand monomorphic members), it is still considerably smaller than Class II. It is also closed: nonce-words and recent loans in a, u, and o always belong in Class II. For the same reasons, the default is Class III for monomorphic stems in neutral vowels.

In (5) below the examples are all monomorphic noun stems, but every non-vocalic Hungarian word falls into one of these classes, irrespective of morphemic composition or lexical category. The plural suffix is representative of the quaternary type: whenever the initial vowel is present in the other quaternary suffixes, it is the same as in the plural. The allative is representative of the ternary type, and the dative, adessive and formal suffixes have been chosen to represent the three major alternating pairs u/e, ú/ș, and i/ii. For the treatment of non-standard (morphophonemic) alteration, see Section 3.

<table>
<thead>
<tr>
<th>Stem</th>
<th>4-ary</th>
<th>3-ary</th>
<th>2-ary</th>
<th>2-ary</th>
<th>2-ary</th>
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<td>badnak</td>
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<td>badul</td>
<td>'army'</td>
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<td>hadul</td>
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<td>lynkait</td>
<td>lóyol</td>
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<td>hitutaks</td>
<td>hitunak</td>
<td>hitot</td>
<td>kóto</td>
<td>'well'</td>
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<td>holdaks</td>
<td>holnak</td>
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<td>holdul</td>
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<td>lótok</td>
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<td>ininhos</td>
<td>inmak</td>
<td>intó</td>
<td>intó</td>
<td>'tendon'</td>
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<td>hejžhos</td>
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<td>hajtul</td>
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<td>'crust'</td>
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<td>babol</td>
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<td>rumnak</td>
<td>rumul</td>
<td>rumul</td>
<td>'id.'</td>
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<td>birókos</td>
<td>birónak</td>
<td>birótol</td>
<td>birótol</td>
<td>'chord'</td>
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<td>botómak</td>
<td>botót</td>
<td>botót</td>
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<td>deötokol</td>
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<td>'wire'</td>
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<td>csežtönak</td>
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<td>hitzok</td>
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<td>hitzul</td>
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<td>vizek</td>
<td>vizekosh</td>
<td>vizenak</td>
<td>vizeul</td>
<td>vizeul</td>
<td>'belief'</td>
</tr>
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<td>sgejk</td>
<td>sgejkosh</td>
<td>sgejkennak</td>
<td>sgejkot</td>
<td>sgejkot</td>
<td>'head'</td>
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<td>érvek</td>
<td>érvekos</td>
<td>érvnamak</td>
<td>érvul</td>
<td>érvul</td>
<td>'argument'</td>
</tr>
<tr>
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<td>hitzhok</td>
<td>hitzhos</td>
<td>hitznak</td>
<td>hitzul</td>
<td>hitzul</td>
<td>'lady'</td>
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<td>tógyzhos</td>
<td>tógyznak</td>
<td>tógyzul</td>
<td>tógyzul</td>
<td>'udder'</td>
</tr>
<tr>
<td>salt</td>
<td>saltshok</td>
<td>saltshos</td>
<td>saltshnak</td>
<td>saltshul</td>
<td>saltshul</td>
<td>'roast'</td>
</tr>
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<td>tőzhok</td>
<td>tőzhos</td>
<td>tőztonak</td>
<td>tőzul</td>
<td>tőzul</td>
<td>'fire'</td>
</tr>
<tr>
<td>bok</td>
<td>bokosh</td>
<td>bokoshos</td>
<td>bokoshnak</td>
<td>bokoshul</td>
<td>bokoshul</td>
<td>'pumpkin'</td>
</tr>
<tr>
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<td>festok</td>
<td>festokos</td>
<td>festoknak</td>
<td>festokul</td>
<td>festokul</td>
<td>'shkin'</td>
</tr>
<tr>
<td>dson</td>
<td>dsonosh</td>
<td>dsonoshos</td>
<td>dsonoshnak</td>
<td>dsonoshul</td>
<td>dsonoshul</td>
<td>'smoke'</td>
</tr>
</tbody>
</table>

1.4 The possessive paradigm

In the morphology of Hungarian, ternary and quaternary suffixes are fully integrated with the rest of the system: not only do the various kinds of suffixes appear in the same position, e.g. as case markers, regardless of arity, but they can also change arity as a result of morphological processes. These facts are exemplified by the possessive paradigm given in (6) below. Only one stem is given for each harmonic class: dr 'master' (Class I); sóg (brother-in-law) (Class II); ember 'man' (Class III); kólye 'lady' (Class IV); and dr 'guard' (Class V).

The 1st, 2nd, and 3rd person forms are given in the 1st, 2nd, and 3rd column respectively. With each stem, the first and third rows contain singular, and the second and fourth rows contain plural possessor forms: the difference between the two is in the number of the possessed (the stem), which is singular in the first two rows and plural in the last two. The reader is encouraged to analyze the forms into component suffixes before looking at the solution offered in 2.3.
The analysis

In this section I will develop an analysis of the above data in a step-by-step fashion. The starting point will be the observation that the difference between the ternary and quaternary suffix vowels can always be expressed by a single feature. This leads to two maximally simple spreading rules that interact with a single exception feature. In order to capture the full pattern reflected in the taxonomy developed above, further rules and representations will be introduced along the way. The resulting system is then applied to the description of the possessive paradigm.

2.1 The basic system

Closer inspection of the data in (5) reveals that whenever there is a difference between the quality of the ternary and quaternary suffix vowels ([at vs. -at in Class I, and -et vs. -et in Class IV]), the quaternary suffix will have the -U. The most straightforward analysis (which will have to be supplemented by other rules later), is to spread the feature values for I and U onto the suffixes, and adjust the underlying representation of exceptional stems so that the spreading of U is blocked for them. This can be achieved by marking the stems in Class I and Class IV by a floating -U. Thus, the cornerstone of the analysis is the following pair of spreading rules:

\[
\begin{align*}
(8A) & \\
I \longrightarrow & JU
\end{align*}
\]

Supposing that the vowel of quaternary suffixes is specified only for A, the rules in (8) will derive e.g. falkó from falk simply by spreading the I and U features of the stem vowel. This solution can readily be extended to ternary suffixes by supposing that these are represented underlyingly with a floating U which can dock only if the I feature of the stem did not spread.

The most important problem with this simple solution is that it does not capture the pattern of exceptions. Without additional 'cleanup' rules we would have to mark every element of Class II in the lexicon, in spite of the fact that Class II is productive, and Class I is closed. In order to deal with this problem, we must posit an independent source for the feature U in recent borrowings. The field of computer science provides many examples such as fi/fö/fól/fe/fe' in ro&m, some of which we exploit below - these forms make it clear that there has to be an U in the representation of the quaternary suffixes themselves.

Adopting a proposal of Halle-Vergnies (1982), I will take this U to be specified in the phonemic case. For those features, like A in Hungarian, that do not harmonize there is no good reason to establish a separate tier. I suppose that the unmarked place for the feature has been lifted to a separate tier - the present analysis will make use of this option only in the case of exceptional elements.

In sum, the underlying representation of quaternary suffixes contains the same features, namely A and U, as that of the ternary suffixes: the difference being that in the quaternary case the U is in the core and in the ternary case it is floating. This 'geometrical' difference will surface only after exceptional stems and, as we shall see later, after certain suffixes. Before turning to these, let me show first how the non-exceptional forms are derived.

In Class II, in, et, and el are exceptional (there are less than 10 monomorphemic in and el stems there) - the Class II pattern is regular only for stems in in, et, and el. Since these do not contain the feature I, (8A) is inoperative. Whether (8B) actually spreads the feature U is stopped from linking up. This is achieved by a rule of floating U deletion:

\[
\begin{align*}
(9) & \\
I \longrightarrow & J
\end{align*}
\]

List spread gives the right result in Class III, provided that the U floating over hás has/hás is stopped from linking up. This is achieved by a rule of floating U deletion:

\[
\begin{align*}
(10) & \\
I \longrightarrow & J
\end{align*}
\]

In the same environment, the core U of ok/ek/ok/ek must also be deleted:

\[
\begin{align*}
(11) & \\
I \longrightarrow & J
\end{align*}
\]

Finally, in Class V, U-spread (8A), U-deletion (9-10), and U-spread (in this order) give the right result.

Notice, that the derivation is essentially the same for forms like tıkőt, tıkókás, as the presence or absence of A-specified plays no role in any of the rules. Although the suffix in question are specified for A, the high-rank parallelism makes it possible to omit the As from the display altogether.
have no other exceptional property: therefore, we derive the correct
it will not spread); in addition, it will have a floating -U, which will derive the correct
hidat (*hidot).

exceptional elements, the i of the zs{r-type words is also specified in the core
Therefore, suffixation of Class IV stems leads to class III forms in ECH and perhaps to Class IV forms in certain dialects.

The only stem in e or e paralleling the behavior of zsir is cell 'goal': this has I in the core but no other exceptional marking.
Every other exceptional element will be marked by a floating -U: the U specification (where present, e.g in lyub, hold, könyék) must be relegated to the core (CV tier).

Moreover, the use of the feature -U unifies the treatment of the exceptional classes: the only vowels we do not find in Class I are u and õ when these are marked by -U, they belong in Class IV. In addition, the bidirectional feature system captures the hitherto unnoticed parallelism between the set u õ i of high vowels and the set e ø e of mid vowels. Since no rule makes reference to the feature A, we expect to find paired elements always in the same class. As can be seen from the data presented in (5), this expectation is fulfilled not only by the regular vowels, but by the irregular ones as well.

In the case of the feature A core-specification was chosen because A never spreads - other features have appeared in the core only exceptionally, just in case they do not undergo the spreading rules in (8). But for I, something like core-specification is necessary in non-exceptional cases as well, since the feature I spreads, but the vowel i is generally permeable ('transparent'). This latter fact is best exemplified by the denominal suffix -i 'characterized by the location' that forms adjectives:

\[(14)\]
\[
\text{hős} \quad \text{hózat} \quad \text{kói} \quad \text{hózak} \quad \text{'house'}
\text{ker} \text{körtét} \quad \text{korti} \quad \text{körtiek} \quad \text{'garden'}
\text{nyár} \text{nyarát} \quad \text{nyári} \text{nyárik} \quad \text{'summer'}
\text{tél} \text{telet} \quad \text{téli} \text{téliek} \quad \text{'winter'}
\text{Fő} \text{Főt} \quad \text{Főtik} \quad \text{Főtiak} \quad \text{t' the village Fő'}
\text{Tők} \text{Tőkt} \quad \text{Tőktik} \quad \text{Tőkétek} \quad \text{t' the village Tők'}
\]

In fact, the suffixes em/em/em and ak/ek/ok/ök both turn Class II and Class V forms into Class I and Class IV forms, respectively, to these latter classes, although exceptional for underived nouns, contain at least two inflected forms for every noun.

Adding the above mentioned suffixes to Class I or Class III stems results again in Class I and Class III forms. In the case of Class IV, there is some vacillation: forms like könyékhez 'book-PL-ALL', könyékhez 'lady-PL-ALL' are acceptable for most native speakers, but the ECH forms appear to be könyékhez, könyékhez. Therefore, suffixation of Class IV stems leads to class III forms in ECH and perhaps to Class IV forms in certain dialects.

The analysis can be extended to capture the behavior of suffix-combinations simply by marking quaternary suffixes (and the -i discussed above) with a floating -U. In this way suffix-combinations such as those in (15) can be derived without further complications. The adjective-forming denominal suffix sa/ss/sa/ss 'having (to do with)', which must also be marked this way, often a particularly good way of testing the proposed mechanism.

In isolation, a form containing this suffix can exhibit behavior characteristic of Class II forms:

\[(15)\]
\[
\text{bot} \text{botot} \quad \text{botonat} \quad \text{botonat} \quad \text{botonat}
\text{füt} \text{fütén} \quad \text{fütén} \quad \text{fütén} \quad \text{fütén}
\]

The suffix -i of hős has I in the core, and floating -U: this will give us the correct hójek, hójeket.

The accessory suffix, bring absolute word-final, cannot be tested.
However, if the form appears in a non-exclamatory meaning, as in

(17) A kertes könyveket jobbra tedd, a hazasakat pedig balra!

'Put those books that have gardens (in them) to the right side, and those that have houses to the left'

the form surfaces as hazasak. This behavior can be explained only if we suppose that the exceptional marking introduced by -as is lost in the exclamatory form hazas, but can be present if the form is derived anew, as required in (17). This derivation is given in (18).

The only rule that will play a role in the derivation is Core/Neg Annihilation, which derives (18B) as the representation of the form hazas from the underlying (18A). If the exceptional marking contributed by the suffix -as/es/os/Ds is retained, we derive (18C) on the next cycle. If the exceptional marking is lost, so that we start with (18D), we derive (18E) as the result of plural suffixation. Finally, since the plural form is not in the lexicon, the exceptional marking contributed by the plural suffix can not be lost, so in the last cycle we derive (18F) in both cases.

(18A) CV-tier hVVz+V<U>s
   U-tier \ -> U

(18B) CV-tier hVVzVs
   U-tier -U

(18C) CV-tier hVVzVs+U
   U-tier \ -> U

(18D) CV-tier hVVzVs
   U-tier -U

(18E) CV-tier hVVzVsz+U
   U-tier -U

(18F) CV-tier hVVzVsV<U>t
   U-tier \ -> U

2.3 The possessive paradigm

The analysis presented above enables us to derive the possessive paradigm in a surprisingly simple fashion. The 1st and 2nd sg markers differ from the accusative and plural markers only in the segmental contents of their C-slots:

2.3 Neutral vowels

The treatment of neutral vowels in polysyllabic stems remains a problem area. It appears to be a very real problem for speakers of Hungarian as well. The 'vacillating' case involve rank e in non-initial syllables. The solution presented in Section 2, was based on the assumption that i and e have the feature I in the core unless they are stressed (as appear in the first syllable). However, we do not have independent evidence that stress and harmony interact in Hungarian, and this makes unclear whether the present analysis contributes to our understanding of the problems posed by neutral vowels.
In this Section I will give a somewhat speculative account of neutrality based on the
concept that archiphonemes are not only the sites, but also the triggers of the harmonic
process. This shift in focus is perhaps best motivated by the existence of 'morphophonemic' 
harmonic alteration where it is clear that the proper surface forms can not be derived by 
simple spreading but require some additional rule(s) which must be tied to the alternating morpheme.
The 3rd sg, 2nd pl and 3rd pl present definite suffixes Hungarian provide such an 
example. The following table gives the present tense paradigm of the stems eőr 'wait', kőr 'ask', and főr 'suffer'. The stems in the first, second, and third columns are first, second, and third person forms, respectively. With each stem, the first two rows give the singulars, 
and the last two rows give the plural forms: the indefinite conjugation is in the odd rows, 
and the definite conjugation is in the even rows.

<table>
<thead>
<tr>
<th>(21A)</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>number</th>
<th>conjugation</th>
</tr>
</thead>
<tbody>
<tr>
<td>várok</td>
<td>vároz</td>
<td>vár</td>
<td>sg</td>
<td>indef</td>
<td></td>
</tr>
<tr>
<td>várom</td>
<td>vározn</td>
<td>várja</td>
<td>sg</td>
<td>def</td>
<td></td>
</tr>
<tr>
<td>várunk</td>
<td>várunk</td>
<td>várnak</td>
<td>pl</td>
<td>indef</td>
<td></td>
</tr>
<tr>
<td>várjuk</td>
<td>várjátk</td>
<td>várják</td>
<td>pl</td>
<td>def</td>
<td></td>
</tr>
</tbody>
</table>

| (21B) | | | | | |
|---|---|---|---|---|
| kőreik | kőréz | kör | sg | indef |
| kőrem | kőréz | körje | sg | def |
| kőrunk | kőrunk | körünk | pl | indef |
| kérjük | kérjék | kérjék | pl | def |

| (21C) | | | | | |
|---|---|---|---|---|
| tőreik | tőréz | tór | sg | indef |
| törrem | tőréz | tórije | sg | def |
| tőrunk | tőrunk | tőrünk | pl | indef |
| tőrjük | tőrjék | tőrjék | pl | def |

The first person suffixes show standard harmonic alternation, and the same holds for 
the first three second person suffixes and the indefinite suffixes in third person. The third person 
definite forms (both for singular and plural) and the 2nd pl definite ending behave differently however.

The 3rd sg definite suffix appears as i with every stem that takes front suffixes, and as 
ja with all other stems (i.e. the ones that take back suffixes). As we have seen in (21), the 
regular alternant of a is e. Thus, we would expect ja/je alternation, and the i form will 
have to be derived from ja by a special rule.17

(22) 'i/je harmony

<table>
<thead>
<tr>
<th>timing tier</th>
<th>CV</th>
<th>V</th>
<th>VC+</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>I</td>
<td>I</td>
<td></td>
</tr>
</tbody>
</table>

| segmental tier | IA | I | I |

The first element (which drops out, together with the A in front contexts) is truly mor-
phonemic: in addition to taking part in nonstandard harmonic alternation, it also assimilates 
to a preceding aliphonic. 'Ordinary' j stays unchanged: compare eőr to kőr to főr.

The checking process can be described by a three-state finite automaton that scans 
the stem right to left. In the initial state, called C, the back alternant is selected. As 
the automaton moves backwards, it can encounter front, neutral, or back vowels. If it encounters 
a back vowel first, the process has ended: the automaton stays in the initial state and we 
get the back alternant. Likewise, if it encounters a front vowel, it moves to state R where 
the front alternant is selected. The third, or N state comes into play when a neutral vowel is 
encountered first: in this case the automaton stays in state N and investigates the preceding vowel.

The results of this investigation are evaluated in the same manner: if the vowel is front, 
the automaton moves to R, if it's back it moves to B and if it's neutral, stays in the N 
state or gets to F - it is this choice that gives the vacillating behavior. The more neutral 
vowels it encounters, the more likely the automaton is to fall into the F state (which seems to

17 Another solution would be to take the i alternant as basic, but in Hungarian suffixes with i generally 
do not show harmonic alternation, so we would still need a special rule that turns into ja in back vowel 
contexts. For the sake of concreteness, I'll take the ja form as basic here, but nothing hinges on this assumption.

18 Of the abstract w' of Vago (1980).
19 The reader should keep in mind that the 'generalizations' presented below are all based on impres-
sionistic judgements, rather than exhaustive testing.
20 Neutral vowels will not be called 'front', their phonetic properties notwithstanding.

Hungarian Vowel Harmony / 159
be the desired generalization), and if there are no more vowels to scan, it moves to F. (This is equivalent to saying that in state N the front alternant is selected.) This description of the automaton will account for the first two generalizations without further stipulations, and the third one follows if we suppose that from N a neutral vowel will necessarily take the automaton to F.

Thus, vacillation corresponds to a probabilistic choice: for those speakers who maintain the third generalization, the choice is deterministic. But the chief advantage of scanning right-to-left is not that we can describe different speakers by changing a simple parameter (although this is certainly desirable)—the crucial argument for this direction comes from non-vacillating stems. Disharmonic roots of the fédérale 'federal' type always take back, while those of the zanger 'singer' type always take front suffixes. Thus, the decisive factor is the last non-neutral vowel, although its effect might be obscured if two or more neutral vowels follow. The automaton given above will work with disharmonic stems without any modifications—the comparable automaton that scans left-to-right would have to be extremely complex to handle disharmonic stems.

4 Conclusion

Stanley’s (1967) objections against a ‘ternary’ use of binary features apply with even greater force in the framework of autosegmental phonology. Theoretically, it is a context like

\[
\begin{array}{ccc}
\text{timing tier} & C & V \\
F-\text{tier} & +F & -F \\
\end{array}
\]

the vowel in the middle can take place in a five-way opposition as given in (24):

\[
\begin{array}{cccc}
CV & V & V & V \\
F- & +F & -F & +F \\
\end{array}
\]

Here (a-c) are more or less standard, and lexical exceptions provide an important source of specifications like (d-e). Certain stems (like those in Class IV) must be marked in the lexicon, and it is an important task of autosegmental phonology to show that the lexical marking in such cases need not involve ad hoc rule exception feature, but can be chosen from a restricted set of diacritics, namely that of floating features.

In this case, the theory forces the feature –U upon us for these stems, thereby accounting for the choice of –el, rather than –ul in a straightforward manner. The –el form could be derived only by positing some source other than the stem for the feature U in it: my proposal is that the U is present (as a floating feature) in the representation of has/haz/hasz. This will also account for the lack of *has: if has receives no I or U specification from the preceding element, the ‘default’ U will automatically link up, and we get *has. (It was supposed that the A feature is present in the UR of every ternary and quaternary suffix.) But the use of negative feature values is strictly limited: in particular, we do not encounter minus-valued features in non-exceptonal cases.

Unlike in Goldsmith’s (1985) analysis, all three features are taken to represent privative oppositions: the absence of an autosegment is interpreted as negative specification for the given feature at every stage of the derivation. The tightness of the feature system leaves no room for underspecification—four features would give 16 possibilities, but with three features, 7 of the 8 possible combinations have to be taken ‘at face value’ in order to distinguish the vowels from each other.

The original aim of underspecification was to capture archiphonemes (i.e., underdifferentiated entities such as the harmonic pair a/e) that will be fully specified in the course of the derivation. This use of blanks is incompatible with the ‘simplex’ interpretation where the lack of specification is equated with negative specification. I suggest that archiphonemes are among the exceptional items inasmuch as they can also receive negative specification. For instance, if we take the dative suffix as underlying, then, the alternant –ed can be derived by

\[
\begin{array}{cccc}
CV & V & V & V \\
F- & +F & -F & +F \\
\end{array}
\]

5 References

Antal L. 1959: Gondolatok a magyar szint szinteziséről. Magyar Nyelv 55, 354-367
Antal L. 1963: The possessive form of the Hungarian noun. Linguistica 3, 36-61
Kontra, M. - Ringen, C. 1985: Stress and harmony in Hungarian loanwords. ms
Remissen, J. 1984: Tri-directional feature systems for vowels. Wiener linguistische Gazette 33-34
Siptár P. 1984: Vitéz a magyar magánhangzó harmoniájáról. Magyar Nyelv 80, 229-238
Vágó, R.M. 1975: Hungarian generative phonology. IULC